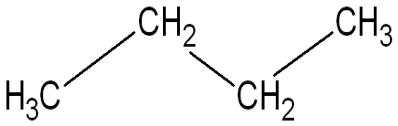
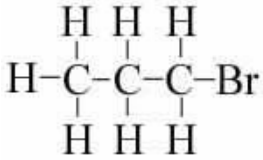
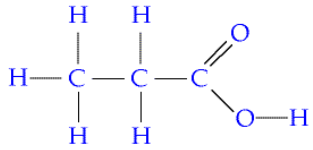
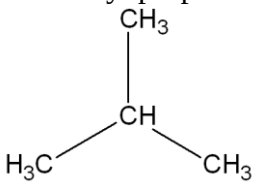
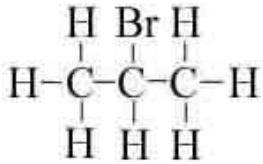
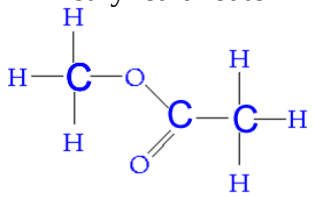
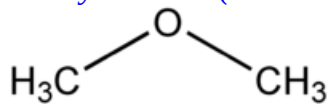
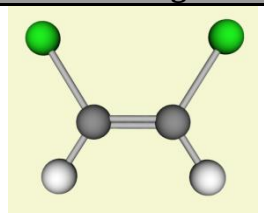
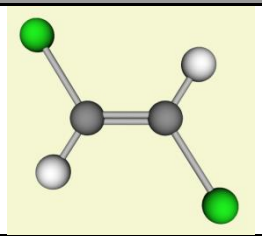
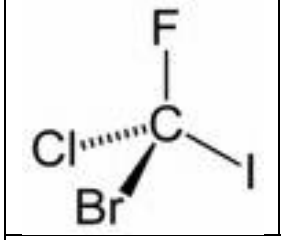
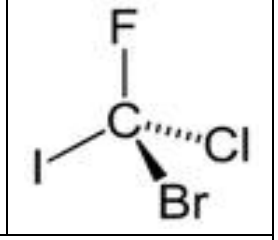
Isomers

Isomers are molecules that have the same molecular formula but different structural formula

1) Constitutional aka Structural

chain isomerism	positional isomerism	functional group isomerism
butane 	1-bromopropane 	propanoic acid 
2 methyl propane 	2-bromopropane 	methyl ethanoate 
pentane C_5H_{12} has 3 isomers make, draw & name them	*make & draw butan-1-ol and butan-2-ol*	*C_2H_6O has 2 isomers methoxy methane (an ether)*  *and*

2) Stereoisomers

geometric cis or trans isomers		Enantiomers	
			
cis-1,2-dichloroethene	trans-1,2-dichloroethene	CBrClFI	

• restricted rotation about a C=C • 2 different groups on the left hand side and 2 different groups on the right hand side	• are mirror images of each other • have the same structural formula •known as optical isomers because of their effect on plane polarised light • have 4 different groups positioned around a chiral carbon atom
make & draw cis-but-2-ene *and* *trans-but-2-ene*	*make & draw 2 3d sketches of butan-2-ol* *so that they are mirror images of each other*
additional information **mp (‘C) / bp (‘C)** **cis: -80 / 60** **trans: -50 / 48** *why is the bp of cis higher?* cis is polar trans is non-polar with permanent dipole forces as well as temporary dipole forces so more energy is required to boil the cis isomer so bp is higher *why is the melting point of cis lower?* in a solid state the molecules must pack together efficiently, however the U shape of the cis isomer will <u>not</u> pack as well as the straight shape of the trans isomer so less energy is needed to melt the cis isomer so the mp is lower	**additional information** A solution of one enantiomer rotates the plane of polarisation in a clockwise direction. This enantiomer is known as the (+) form or given the letter L for **levorotatory** A solution of the other enantiomer rotates the plane of polarisation in an anti-clockwise direction. This enantiomer is known as the (-) form or given the letter D for **dextrorotatory** When optically active substances are made in the lab, they often occur as a 50/50 mixture of the two enantiomers. This is known as a **racemic** mixture or racemic. It has no effect on plane polarised light.